Lesson 10: Subtracting Rational Numbers

Let's bring addition and subtraction together.

10.1: Number Talk: Missing Addend

Solve each equation mentally. Rewrite each addition equation as a subtraction equation.

$247 + c = 458$

$c + 43.87 = 58.92$

$\frac{15}{8} + c = \frac{51}{8}$

10.2: Expressions with Altitude

A mountaineer is changing elevations. Write an expression that represents the difference between the final elevation and beginning elevation. Then write the value of the change. The first one is done for you.

beginning elevation (feet)	final elevation (feet)	difference between final and beginning	change
+400	+900	$900 - 400$	+500
+400	+50		
+400	-120		
-200	+610		
-200	-50		
-200	-500		
-200	0		

Are you ready for more?

Fill in the table so that every row and every column sums to 0. Can you find another way to solve this puzzle?

	-12	0		5
0			-18	25
25		-18	5	-12
-12				-18
	-18	25	-12	

	-12	0		5
0			-18	25
25		-18	5	-12
-12				-18
	-18	25	-12	

10.3: Does the Order Matter?

1. Find the value of each subtraction expression.

A
$3 - 2$
$5 - (-9)$
$(-11) - 2$
$(-6) - (-3)$
$(-1.2) - (-3.6)$
$(-2\frac{1}{2}) - (-3\frac{1}{2})$

B
$2 - 3$
$(-9) - 5$
$2 - (-11)$
$(-3) - (-6)$
$(-3.6) - (-1.2)$
$(-3\frac{1}{2}) - (-2\frac{1}{2})$

2. What do you notice about the expressions in Column A compared to Column B?

3. What do you notice about their values?

10.4: Phone Inventory

A store tracks the number of cell phones it has in stock and how many phones it sells.

The table shows the inventory for one phone model at the beginning of each day last week. The inventory changes when they sell phones or get shipments of phones into the store.

	inventory	change
Monday	18	-2
Tuesday	16	-5
Wednesday	11	-7
Thursday	4	-6
Friday	-2	20

1. What do you think it means when the change is positive? Negative?

2. What do you think it means when the inventory is positive? Negative?

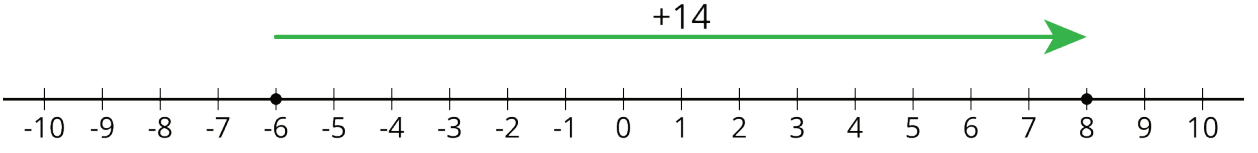
3. Based on the information in the table, what do you think the inventory will be at on Saturday morning? Explain your reasoning.

4. What is the difference between the greatest inventory and the least inventory?

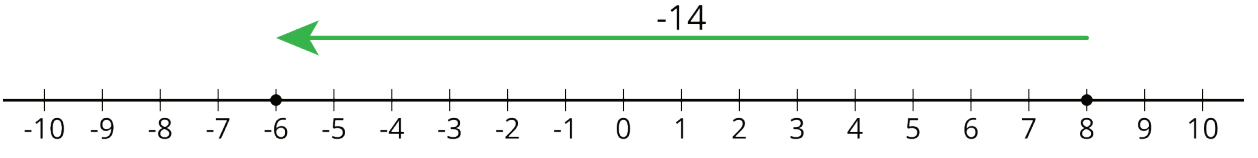
Lesson 10 Summary

When we talk about the difference of two numbers, we mean, "subtract them." Usually, we subtract them in the order they are named. For example, the difference of +8 and -6 is $8 - (-6)$.

The difference of two numbers tells you how far apart they are on the number line. 8 and -6 are 14 units apart, because $8 - (-6) = 14$:



Notice that if you subtract them in the opposite order, you get the opposite number:



$(-6) - 8 = -14$

In general, the distance between two numbers a and b on the number line is $|a - b|$. Note that the *distance* between two numbers is always positive, no matter the order. But the *difference* can be positive or negative, depending on the order.

Sometimes we use positive and negative numbers to represent quantities in context. Here are some contexts we have studied that can be represented with positive and negative numbers:

- temperature
- elevation
- inventory
- an account balance
- electricity flowing in and flowing out

In these situations, using positive and negative numbers, and operations on positive and negative numbers, helps us understand and analyze them. To solve problems in these situations, we just have to understand what it means when the quantity is positive, when it is negative, and what it means to add and subtract them.